REMARKS

The Examiner rejected all pending claims. Specifically, the Examiner rejected claims 1-4, 7-11 and 32-35 under 35 U.S.C. §102(b), as being anticipated by U.S. Patent No. 6,097,859 of Solgaard et al. ("Solgaard"); claims 1-7 and 32-35 under §102(b) as being anticipated by U.S. Patent No. 5,504,575 of Stafford ("Stafford"); claims 18-21, 24-31 and 36-38 under §103(a) as unpatentable over Solgaard in view of U.S. Patent No. 6,177,992 of Braun et al. ("Braun"); claims 12-17 under §103(a) as unpatentable over Solgaard in view of U.S. Patent No. 3,090,278 of Saunderson ("Saunderson"); and claims 18-27, 29 and 36 under §103(a) as unpatentable over Stafford in view of Braun. Applicants have cancelled claims 30, 33, 34, 37 and 38, and have amended independent claims 1, 18, 32 and 35 to better describe novel features of the invention, which are not found in the prior art. For the reasons stated below, Applicants assert that all pending claims are now allowable.

Independent Claims 1 and 32

Independent claim 1 has been amended to recite an optical apparatus having an *array of optical detectors*, including a plurality of optical detectors, each corresponding to a unique spectral channel. Applicants discuss this type of configuration on page 8, paragraph 25 of the pending application:

> It will be appreciated that one or more additional optical detectors may be employed in the embodiment of FIG. 1, and correspond with the micromirrors according to a predetermined or dynamic scheme, if so desired in a practical application. For instance, in the event that a selected group of the spectral channels (e.g., the "even-numbered" or "odd-numbered" spectral channels) is desired to be monitored concurrently, **a plurality of optical detectors may be accordingly implemented to be in a one-to-one correspondence with the micromirrors that are directing the selected spectral channels.** (Emphasis added)(*See also* page 10, paragraph 29, teaching that the spectral channels reflected by each micromirror may be separately received by respective optical detectors).

As explained above, this configuration has significant advantages over prior art systems. For instance the claimed configuration allows selected groups of spectral channels (e.g., even and odd numbered channels) to be monitored concurrently, while still allowing monitoring of channels in a time division multiplexed manner.

None of the prior art of reference discloses this type of configuration. Solgaard describes an optical apparatus that uses a **single** infrared diode detector 78. (Solgaard at col. 9, lines 5-9). Solgaard uses a actuating mirror to selectively send signals to the single detector 78. (Solgaard at col. 9, lines 5-12). Stafford also discloses systems having only a single detector, i.e., detector 28 or 100. (Stafford at col. 3, lines 18-19; col. 4, lines 33-38). Likewise, Braun discloses only a single detector. (Braun at col. 3, lines 20-21). Saunderson does not teach using an array of detectors in this manner or individually controllable beam manipulating elements for deflecting the spectral channels into the detectors in a time-division multiplexed manner.

Therefore, none of the prior art can provide an optical apparatus, as recited in the claimed invention, that monitors spectral channels in a time division multiplexed manner, while still allowing a select group of spectral channels to be monitored concurrently. No prior art reference discloses Applicants' claimed limitation reciting an optical apparatus having *an array* of optical detectors, including a plurality of optical detectors, each corresponding to a unique one of said spectral channels. Because this limitation is not taught or suggested in the prior art, no single reference or combination of references can anticipate or render obvious claim 1 (or claims 2-17, which depend from claim 1). *See* MPEP 2143.03.

Claim 32 recites a method of spectral power monitoring. Like claim 1, claim 32 recites directing spectral channels into an array of optical detectors, whereby at least some of the spectral channels may be received by unique ones of said optical detectors. As in the apparatus of claim 1, the claimed method allows for a select group of spectral channels to be monitored concurrently, while still allowing others to be monitored in a time division multiplexed manner. As set forth above, none of the prior art discloses or suggests the use of an array of optical detectors in a time division multiplexed monitoring scheme. For at least these reasons, claim 32 is also allowable over the prior art of record.

Independent Claim 18 and 35

Independent claim 18 has been amended to recite an optical apparatus including at least one first and second optical detector, for monitoring power associated with separate polarization

components. By separately and concurrently monitoring both polarization components, the claimed invention provides improved accuracy by compensating for polarization-sensitive effects of components within the optical system, such as the polarization dependency of a wavelength-disperser (e.g., a diffraction grating). (Pending Application at page 9, paragraph 28). This configuration provides significant advantages over prior art systems, which do not compensate for polarization-sensitive effects by separately monitoring distinct polarization components.

None of the prior art discloses the use of separate detectors to concurrently monitor the power associated with distinct polarization components. Solgaard describes an optical apparatus that uses a **single** infrared diode detector 78, and does not address the difference in power levels of polarization components. (Solgaard at col. 9, lines 5-9). Stafford also discloses systems having only a single detector, i.e., detector 28 or 100, and does not address polarization sensitivity. (Stafford at col. 3, lines 18-19; col. 4, lines 33-38). Saunderson does not suggest or disclose compensating for polarization-sensitive effects. Braun teaches only the use of a single detector. (Braun at col. 3, lines 20-21). Therefore, none of the prior art discloses or suggests the claimed time-division multiplexed system, which utilizes at least two separate detectors for concurrently monitoring the power levels of distinct polarization components of a plurality of spectral channels.

The Examiner argues that the combination of Solgaard in view of Braun would render obvious a time-division multiplexed system using separate detectors to separately monitor distinct polarization components of multiple spectral channels. (See Office action at pages 5 and 6, arguing that the combination of Solgaard and Braun would render obvious former claims 30 and 38). However, for a proposed combination to render a claim obvious, it must teach or suggest *all* limitations. Neither Solgaard nor Braun discloses or suggests the use of separate detectors to concurrently monitor the power levels of separate polarization components (which may vary due to the polarization-sensitive effects) of multiple spectral channels. Therefore, the proposed combination does not teach all limitations of amended claim 18, and cannot render claim 18 obvious.

None of the prior art can provide an optical apparatus, as recited in the claimed invention, in which multiple spectral channels can be monitored in a time division multiplexed manner, and which includes separate detectors for concurrently monitoring distinct polarization components of the spectral channels. Because this limitation is not taught or suggested in the prior art, no single reference, nor combination of references can anticipate or render obvious claim 18 (or claims 19-29 and 31, which depend from claim 18). *See* MPEP 2143.03.

Claim 35 recites a method of spectral power monitoring. Like claim 18, claim 35 utilizes a time-division multiplexed scheme to monitor power levels of various spectral channels, while compensating for polarization-sensitive effects. As in the apparatus of claim 18, the claimed method allows for distinct polarization components of the spectral channels to be monitored concurrently by separate detectors. As set forth above, none of the prior art discloses or suggests the use of separate optical detectors to monitor power levels of distinct polarization components of spectral channels in a time division multiplexed monitoring scheme. For at least these reasons, claim 35 is also allowable over the prior art of record.

CONCLUSIONS

Applicants' invention is both novel and nonobvious over the prior art for the reasons set forth above. None of the prior art of record, either alone or in combination, teaches each and every element of Applicants' claimed invention.

For all of these reasons, Applicant respectfully asserts that all of claims 1-29, 31-32 and 35 are in condition for allowance in their present form. The Examiner's early reconsideration is respectfully requested. If the Examiner has any questions, the Examiner is invited to contact Applicant's attorney at the following address or telephone number:

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Dated: July 7, 2003

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Appendix A

Claim 1 (amended, marked up version)

An optical apparatus, comprising:

a) an input port, providing a multi-wavelength optical signal;

b) a wavelength-disperser that separates said multi-wavelength optical signal by wavelength into multiple spectral channels having a predetermined relative arrangement;

c) an array of beam-manipulating elements positioned to correspond with said spectral channels; and

d) an array of optical detectors, including a plurality of optical detectors each corresponding to a unique one of said spectral channels;

wherein said beam-manipulating elements are individually controllable, so as to direct said spectral channels into said array of optical detectors in a time-division-multiplexed sequence.

Claim 8 (amended, marked up version)

The optical apparatus of claim 1 wherein said array of optical detectors comprises an element selected from the group consisting of PN photo detectors, PIN photo detectors, and avalanche photo detectors.

Claim 18 (amended, marked up version)

An optical apparatus, comprising:

a) an input port, providing a multi-wavelength optical signal;

b) a polarization-separating element that decomposes said multi-wavelength optical signal into first and second polarization components;

c) a polarization-rotating element that rotates a polarization of said second polarization component by approximately 90-degrees;

d) a wavelength-disperser that separates said first and second polarization components by wavelength respectively into first and second sets of optical beams;

e) a beam-focuser that focuses first and second sets of optical beams into corresponding focused spots;

f) an array of beam-manipulating elements positioned to correspond with said first and second sets of optical beams; [and]

g) at least one <u>first</u> optical detector <u>for monitoring power associated with said first polarization component</u>; <u>and</u>

h) <u>at least one second optical detector for monitoring power associated with said second polarization component;</u>

wherein said beam-manipulating elements are individually controllable, such that first and second optical beams associated with each wavelength are directed into said at least one <u>first</u> optical detector <u>and said at least one second optical detector, respectively,</u> in a time-division-multiplexed sequence.

<u>Claim 29 (amended, marked up version)</u>

The optical apparatus of claim 18 wherein said at least one <u>first</u> optical detector <u>and said at least one second optical detector each</u> comprises a single optical detector.

<u>Claim 31 (amended, marked up version)</u>

The spectral monitoring apparatus of claim 18 wherein said at least one <u>first</u> optical detector <u>and said at least one second optical detector each</u> comprises at least one element selected from the group consisting of PN photo-detectors, PIN photo detectors, and avalanche photo detectors.

Claim 32 (amended, marked up version)

A method of spectral power monitoring using a time-division-multiplexed scheme, comprising:

a) providing a multi-wavelength optical signal;

b) separating said multi-wavelength optical signal by wavelength into multiple spectral channels; and

c) directing said spectral channels into an array of optical detectors, such that each of said spectral channels is received by a unique one of said optical detectors in a time-division-multiplexed sequence.

Claim 35 (amended, marked up version)

A method of optical spectral power monitoring, comprising:

a) providing a multi-wavelength optical signal;

b) decomposing said multi-wavelength optical signal into first and second polarization components;

c) rotating a polarization of said second polarization component by approximately 90-degrees;

d) separating said first and second polarization components by wavelength respectively into first and second sets of optical beams;

e) focusing said first and second sets of optical beams into corresponding focused spots;

f) impinging said first and second sets of optical beams onto an array of beam-manipulating elements; and

g) individually controlling said beam-manipulating elements, [whereby] such that said first set of optical beams is directed into at least one first optical detector in a time-division-multiplexed sequence, whereby said at least one

first optical detector monitors power associated with said first polarization component, and said second set of optical beams is directed into at least one second optical detector in a time-division multiplexed sequence, whereby said at least one second optical detector monitors power associated with said second polarization component [and second optical beams associated with each wavelength are directed into at least one optical detector in a time-division-multiplexed sequence].